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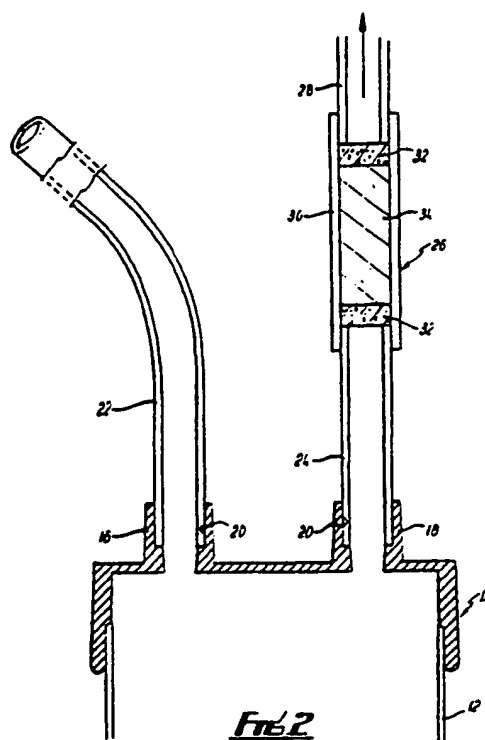
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(54) **Flow control device**

(57) A flow control device comprises a tube 30 enclosing a mass of material 34 between two porous plugs 32, said material expanding to prevent further flow when contacted by a liquid contaminant in the fluid flowing through the tube. In particular the device is used on the downstream side of a disposable vessel 12, into which mucus etc is sucked from the mouth of a newborn baby, and prevents mucus from reaching the mouth of the nurse who applies suction to outlet 28. In Fig. 3 the device is built directly into the outlet from vessel 12. Material 34 may be granular agar, gelatine or diatomaceous compound.



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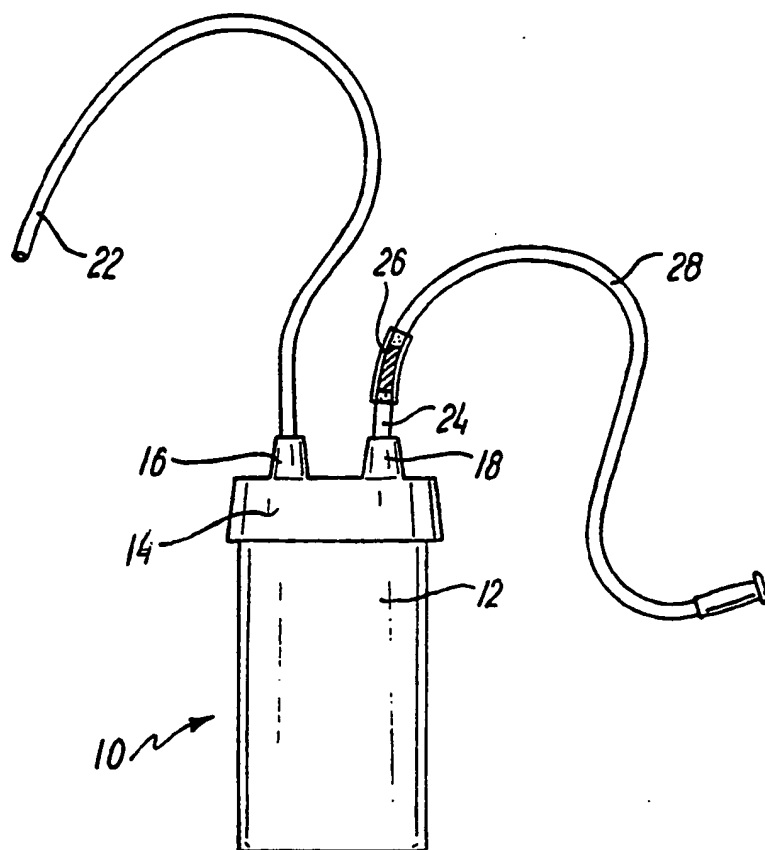


FIG. 1

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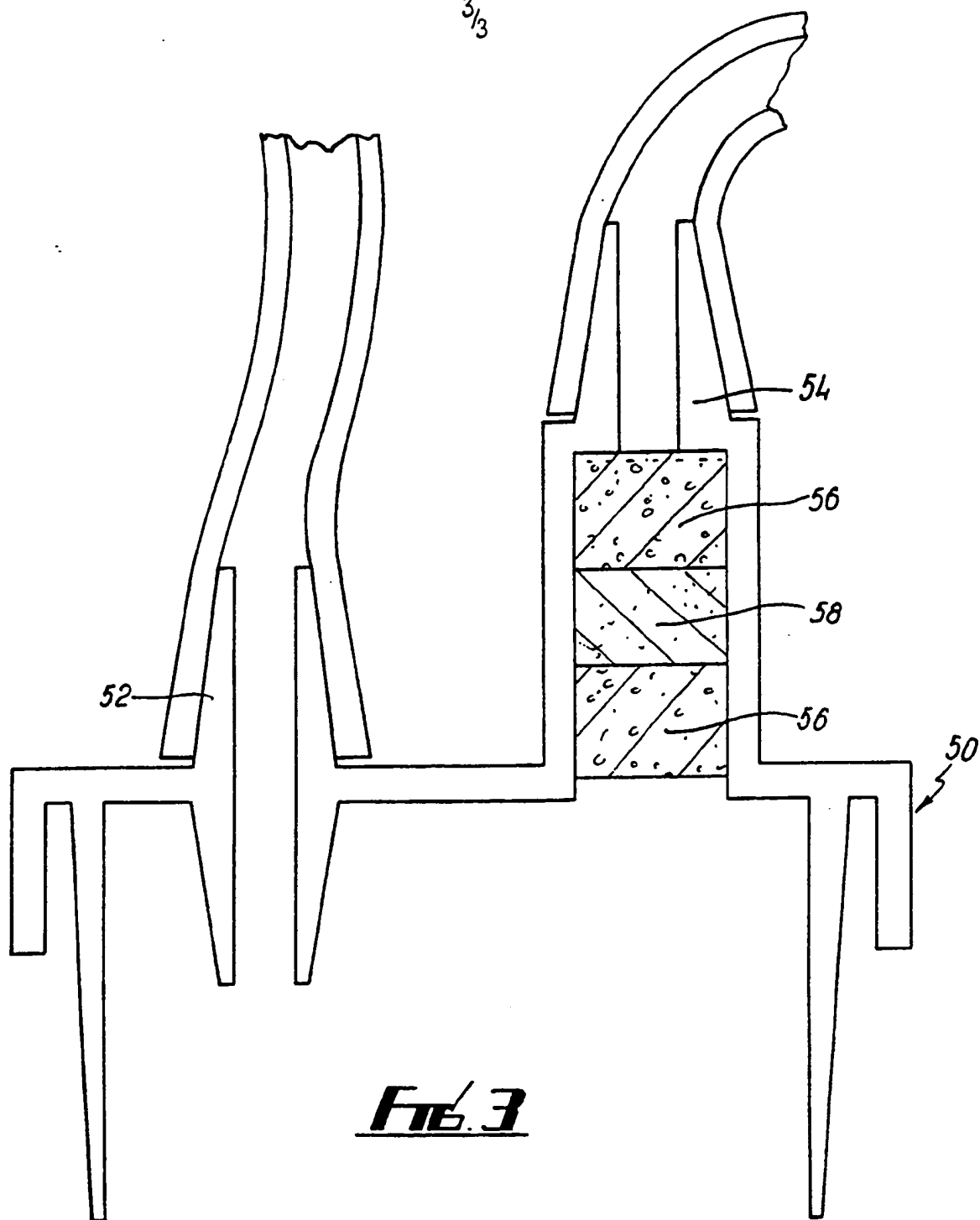


FIG. 3

This invention relates to fluid flow control devices, especially those which prevent the passage of certain fluids, and particularly but not exclusively to such devices for use in disposable mucus extractors.

Disposable mucus extractors are a cheap and effective way of clearing mucus, blood, and amniotic liquid from the mouth and upper respiratory tracts of newborn babies. They are also used for collecting body fluids for medical analysis. The extractor consists of two lengths of tubing connected via a small plastic reservoir. The one tube is inserted into the mouth of the baby and the other into the operators mouth (usually a nurse or midwife) who sucks out the mucus which is then collected in the reservoir.

Providing the mucus extractor is used properly i.e. it is not overfilled or used in a horizontal position, the risk of transfer of a patient's mucus to the mouth of the operator is remote. Mucus which is inhaled, ingested or in contact with damaged buccal surfaces could put the user at risk of infection. However, accidental ingestion does occur as the extractor can easily become full or lie at such an angle that fluid is sucked into

the tube used by the operator and into their mouth. At present some extractors have filters made of foamed plastics material but these do not reduce the flow of fluid up the operator's tube to such an extent as to prevent fluid ingestion.

There is much concern amongst midwives, as many have had the experience of taking patient's mucus into their mouths. Many require a safer mucus extractor.

According to the present invention there is provided a fluid flow control device for a passage, the device comprising a control member adapted to extend across the passage, said member comprising a substance which is initially permeable but gels and/or expands upon contact with certain fluids thereby blocking the passage.

Preferably the substance is particulate, and means are provided for restraining the control member within the passage. The restraining means may comprise a pair of plugs each extending substantially across the passage locatable one on either side of the control member. The plugs are preferably made of a porous material and may be made of a synthetic sponge rubber.

Preferably the substance gels and/or expands in the

presence of water, and the substance may be agar or gelatine, or may be a diatomaceous compound.

Also according to the present invention there is provided a mucus extractor comprising a sealed collecting vessel, first and second tubes leading from the vessel, the free end of the first tube intended to be located in a patient's mouth, and the free end of the second tube intended for applying suction to, and a fluid flow control device as described in any of the preceding three paragraphs located in the second tube.

An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings in which:-

Fig 1 is a side view of a mucus extractor incorporating a control device according to the present invention;

Fig 2 is a cross-sectional side view of part of the extractor of Fig 1; and

Fig 3 is a cross-sectional side view of part of a modified mucus extractor.

Figs 1 and 2 show a disposable mucus extractor 10 suitable for use with newborn babies. The extractor 10 comprises a cylindrical open topped collecting vessel 12 made from a clear plastics material. A cap 14 sealingly snap fits onto the vessel 12 and has an inlet 16 and outlet 18 formed therein with upstanding side walls.

The inlet 16 and outlet 18 have an enlarged diameter portion 20 to accommodate a tube. A length of tubing 22 is slidably fitted into the inlet 16. A short length of tubing 24 is slidably fitted into the outlet 18. One end of a fluid flow control device 26 is fitted onto the free end of the tubing 24. A further length of tubing 28 extends from the opposite end of the device 26.

The device 26 comprises a length of tubing 30 of substantially the same internal diameter as the outlet 18. The respective ends of the lengths of tubing 24, 28 slidably fit into opposite ends of the tube 30. A plug 32 is provided at each end of the tube 30 adjacent the ends of the tubing 24, 28. The plugs 32 comprise a disc which slidably fits in the tube 30 and may be made, for example, of a synthetic sponge rubber. Restrained between the discs 32 is a quantity of material which gels and/or expands in the presence of water, which in this embodiment is fine powdered bacteriological agar.

In use, the free end of the tubing 22 is placed in a baby's mouth and suction is provided at the free end of the tubing 28 by a person sucking. Mucus is sucked up the tubing 22 into the collecting vessel 12. If the container 12 becomes full or is tipped up, mucus may enter the tubing 24. Upon mucus reaching the device 26 it passes through the upstream plug 32 into the agar 34. The water content of the mucus will cause the agar 34 to expand and gel thus blocking the tube 30 and preventing mucus reaching the free end of the tubing 28 and therefore being ingested by the person sucking.

There is thus described a fluid flow control device for mucus extractors which removes the danger of mucus being sucked out of the extractor. The device is of relatively simple construction and the components use therein are low in cost. The device can thus be inexpensively manufactured. This device can be readily fitted onto existing extractors. The use of the porous sponge rubber plugs and the particulate agar means that the air flow through the tube 30 is not significantly restricted and thus it is not difficult to suck the mucus into the collecting vessel 12.

Fig 3 shows a modified cap 50 for a mucus extractor in which the inlet 52 and outlet 54 have a different

structure to those shown in Figs 1 and 2. In this example a control device comprising sponge rubber plugs 56 and agar 58 is provided within the outlet 54.

Various modifications may be made with departing from the scope of the invention. As shown in Fig 3 the cap and tubing may be differently formed. Other substances could be used in the control device and these could be restrained by different means.

It is to be realised that the present invention should not be restricted to the above described application, but could be used in many different situations. For example the control device could be used with surgical suction pumps to prevent infected or contaminated water-based fluids entering the machinery of the pump. This is obviously very important as such an entry of contaminated fluids would necessitate stringent cleaning of the pump and may cause damage thereto. The control device could be used with various articles of laboratory equipment to prevent fluids entering machinery or electronic components whilst allowing free flow of air to the equipment. This control device could also be used with other electronic devices and manufacturing machinery. In these instances other substances could be better suited to be used in the device, for example

gelatine or a diatomaceous compound. In other instances fluids other than water based fluids may be encountered and again this would obviously necessitate using a different compound in the control device.

CLAIMS

1. A fluid flow control device for a passage, the device comprising a control member adapted to extend across the passage, said member comprising a substance which is initially permeable but gels and/or expands upon contact with certain fluids thereby blocking the passage.

2. A device according to claim 1, in which means are provided for restraining the control member within the passage.

3. A device according to claim 2, in which the substance is particulate.

4. A device according to claim 2 or claim 3, in which the restraining means comprise a pair of plugs each extending substantially across the passage locatable one on either side of the control member.

5. A device according to claim 4, in which the plugs are made of a porous material.

6. A device according to claim 5, in which the plugs are made of a synthetic sponge rubber.

7. A device according to any of the preceding claims,

in which the substance gels and/or expands in the presence of water.

8. A device according to claim 7, in which the substance is agar.

9. A device according to claim 7, in which the substance is gelatine.

10. A device according to any of the preceding claims, in which the substance is a diatomaceous compound.

11. A mucus extractor comprising a sealed collecting vessel, first and second tubes leading from the vessel, the free end of the first tube intended to be located in a patient's mouth, and the free end of the second tube intended for applying suction to, and a fluid flow control device according to any of claims 1 to 10 located in the second tube.

12. A fluid flow control device for a passage substantially as hereinbefore described with reference to the accompanying drawings.

13. A mucus extractor substantially as hereinbefore described with reference to Figs 1 and 2 of the accompanying drawings.

14. A mucus extractor substantially as hereinbefore described with reference to Figs 1 and 2 of the accompanying drawings.

15. Any novel subject matter or combination including novel subject matter herein disclosed, whether or not within the scope of or relating to the same invention as any of the preceding claims.

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